

Homestake Underground Laboratory

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March 4, 2004

Homestake: What's New?

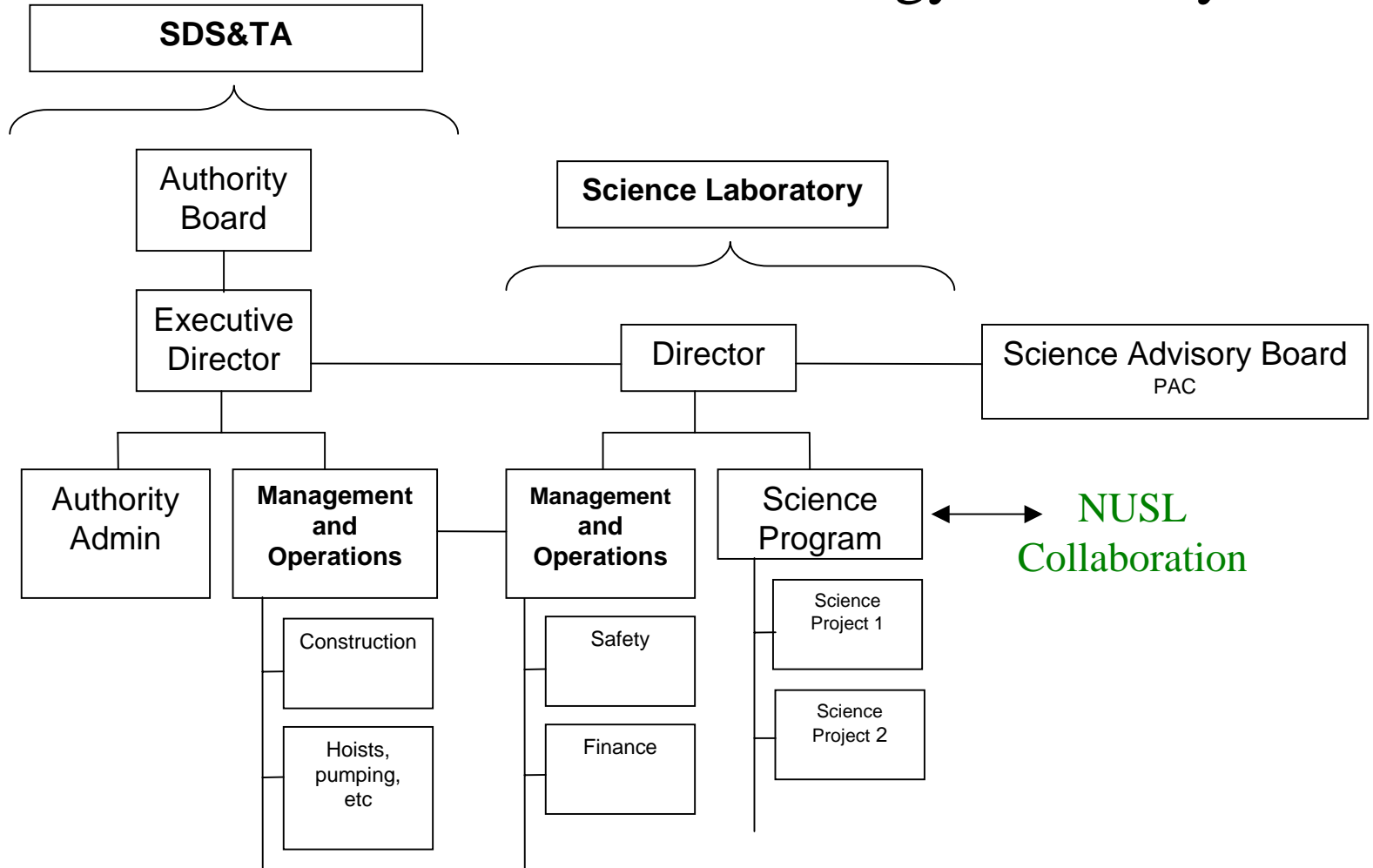
- NSF to announce process:
 - Consideration of underground lab(s)
 - March 29 meeting at NSF
- Major obstacles at Homestake overcome:
 - Agreement exists for acquisition of Homestake mine
 - Liability issues solved by state of SD
 - \$10 M\$ liability fund and insurance
 - Science Laboratory proposed
 - Mechanism for Cooperation between SD and scientists
- Homestake ready to go!
 - Letter of intent by March 29

Homestake

- A Deep Laboratory dedicated to science
 - Accommodates all experiments requiring great depth
 - Physics
 - Geoscience
 - National Security
 - Outreach and Education
- Staged Approach to lab construction
 - Infrastructure
 - South Dakota (Governor Rounds, Gowen)
 - Science Laboratory
 - NUSL Collaboration (Marshak PI, Lesko Spokesperson)

Model Organization

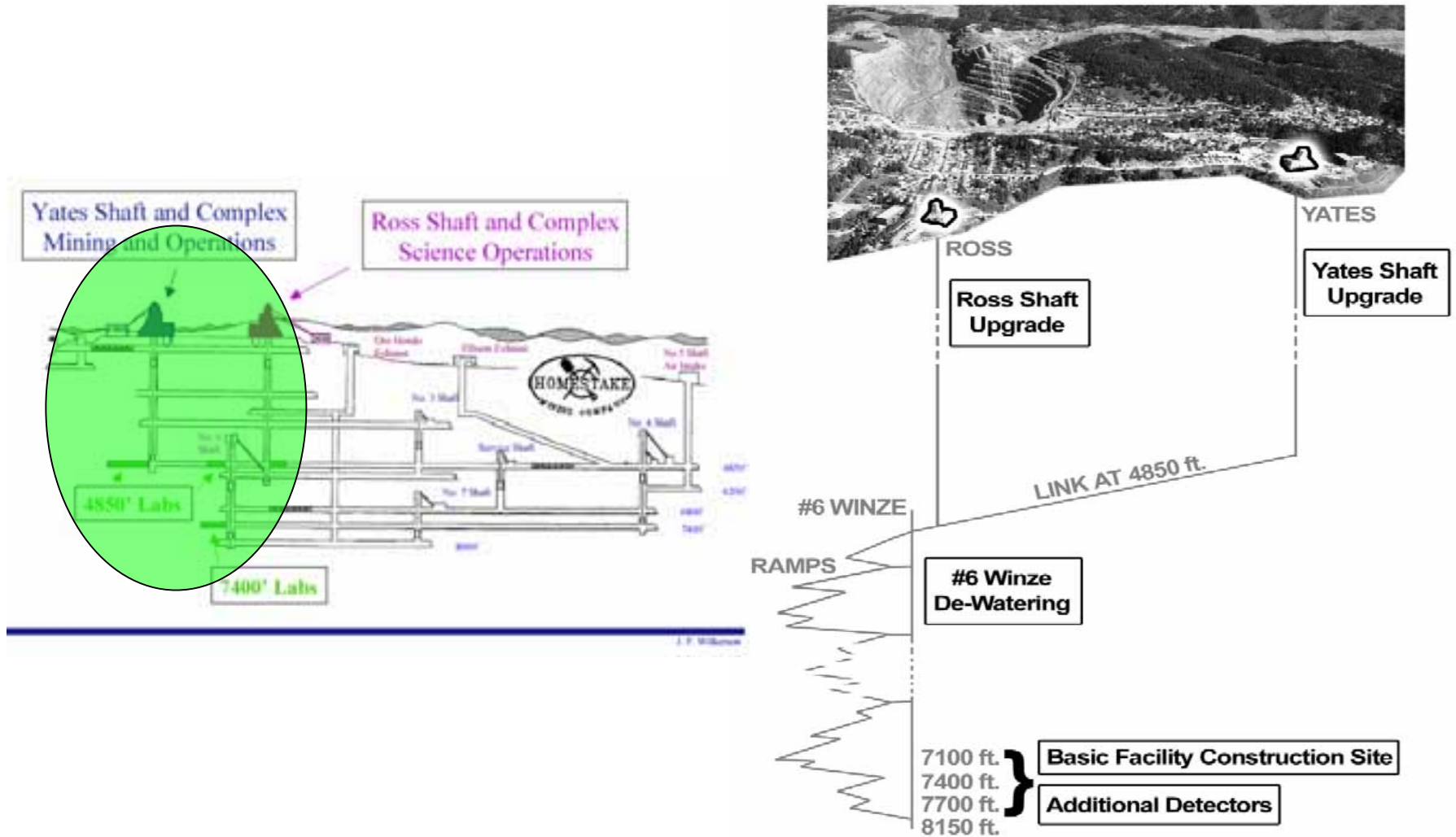
Science Laboratory and South Dakota Science & Technology Authority



State of South Dakota

- Conceptual Design of Infrastructure Laboratory
- South Dakota Science and Technology Authority
 - Own, Construct and Operate Infrastructure Lab
- Agreement with Homestake Mining Company
 - Acquisition of mine
 - Indemnification of Homestake
- Appropriated \$24 million
 - Acquisition and refurbishment of the mine

Elevation View of Homestake





Brookhaven 040303

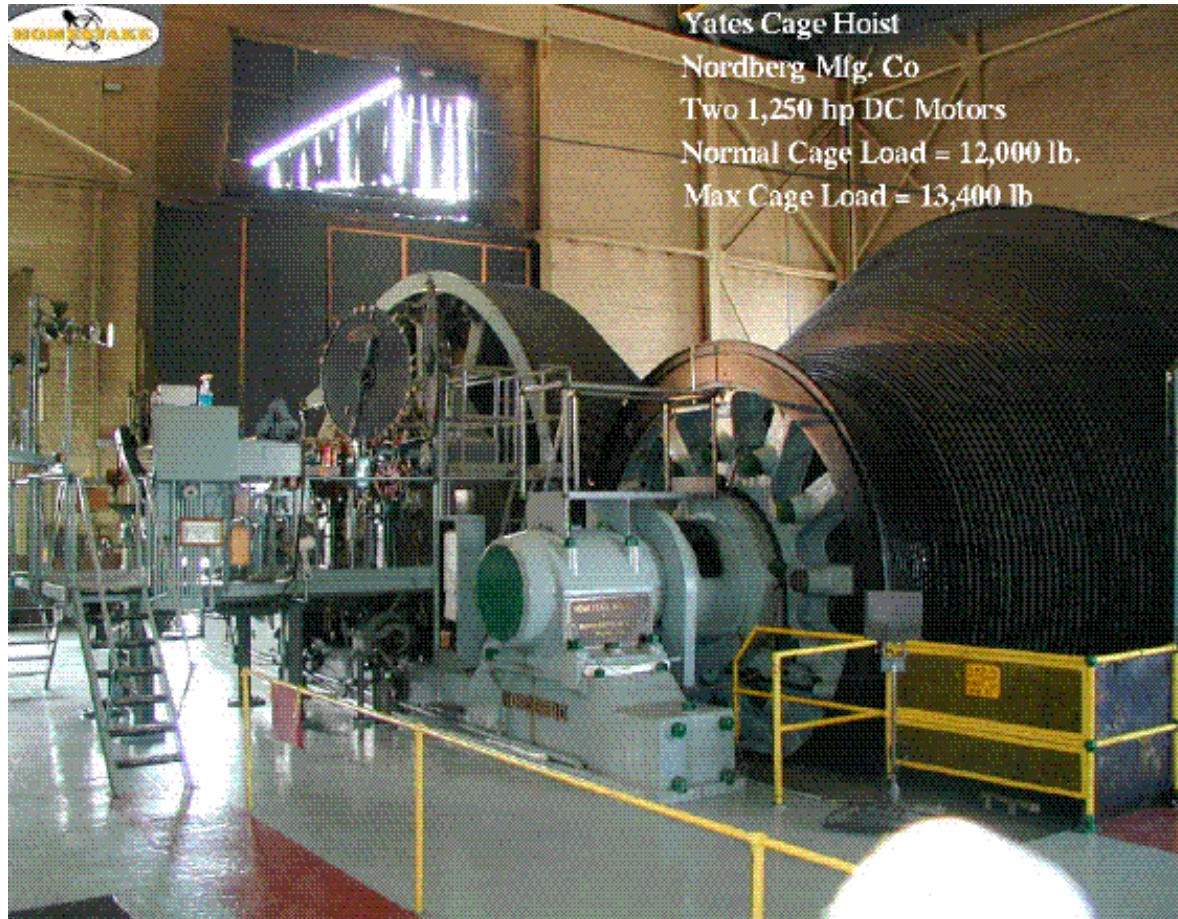
Buildings Near the Yates Shaft



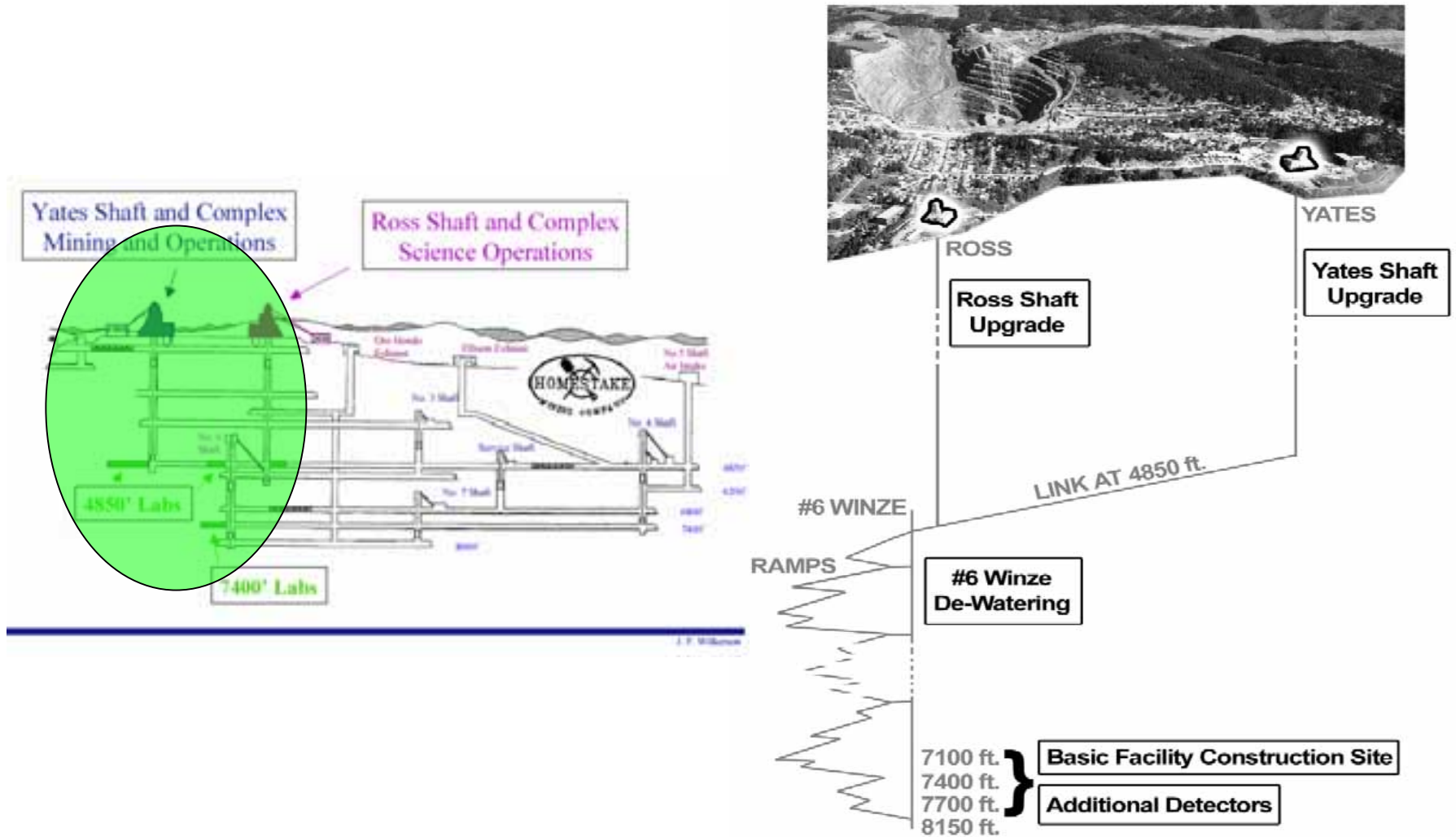
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Yates Cage Hoist

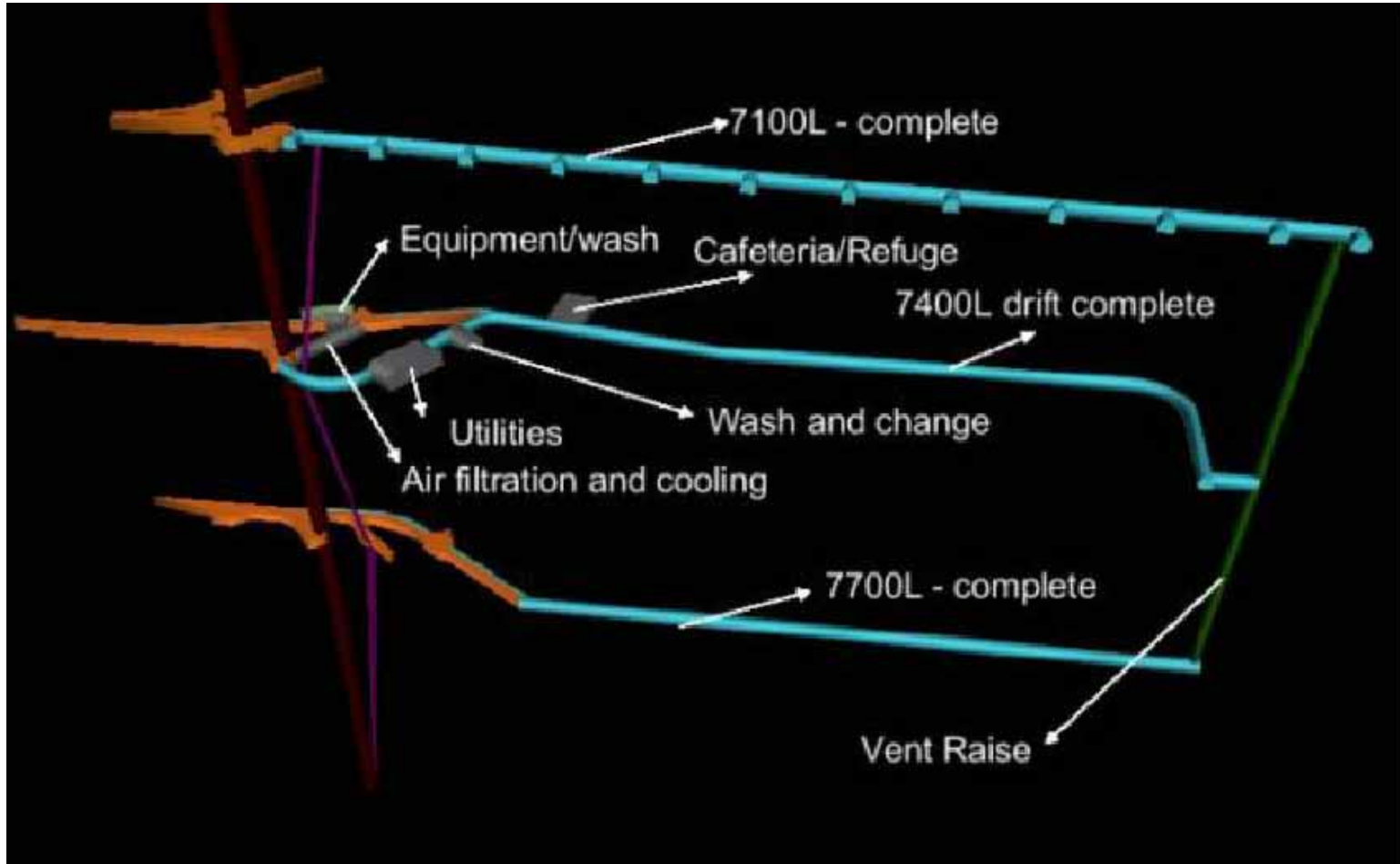


Elevation View of Homestake



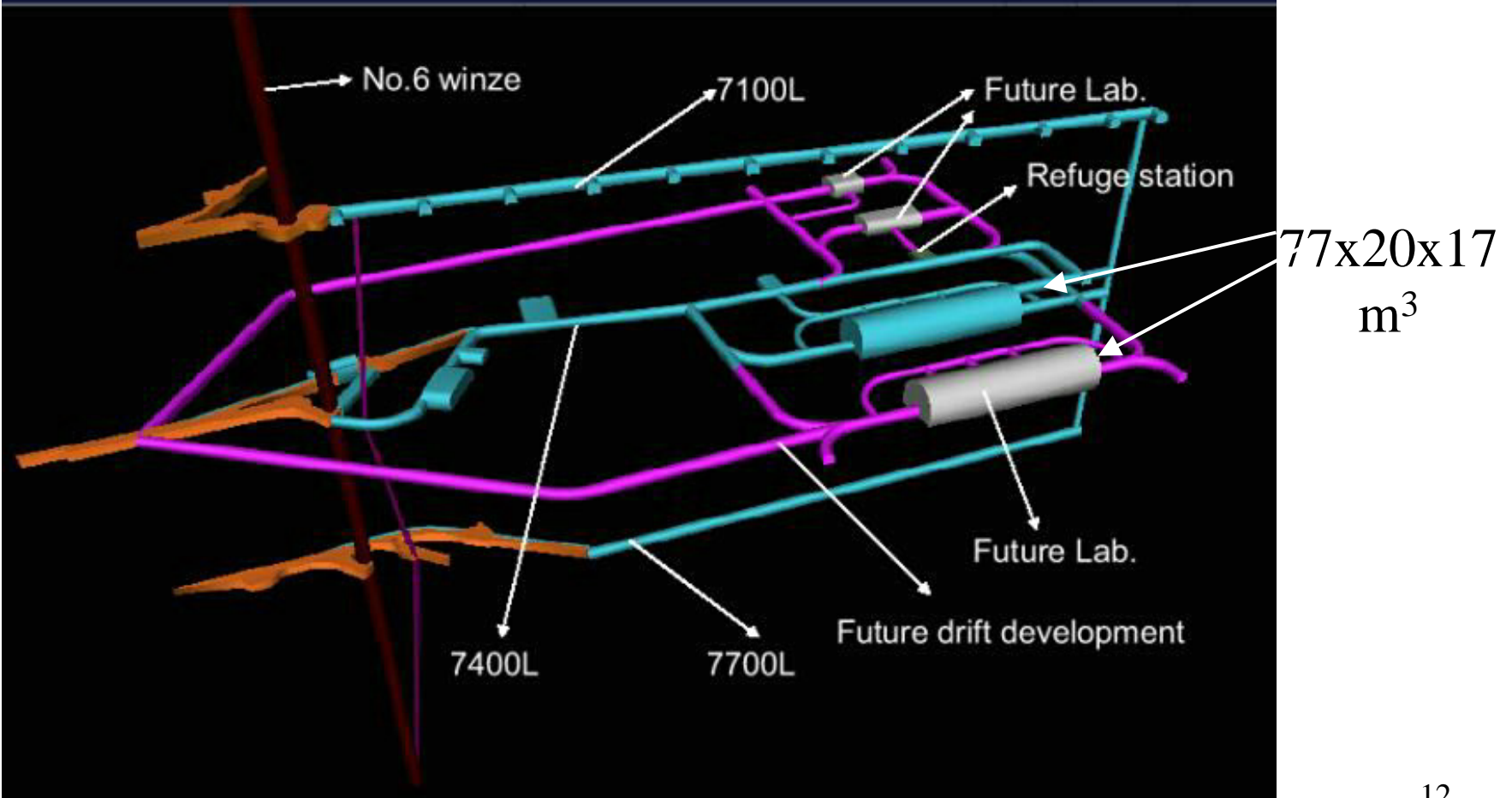
Infrastructure Laboratory

7100L 7400L 7700L

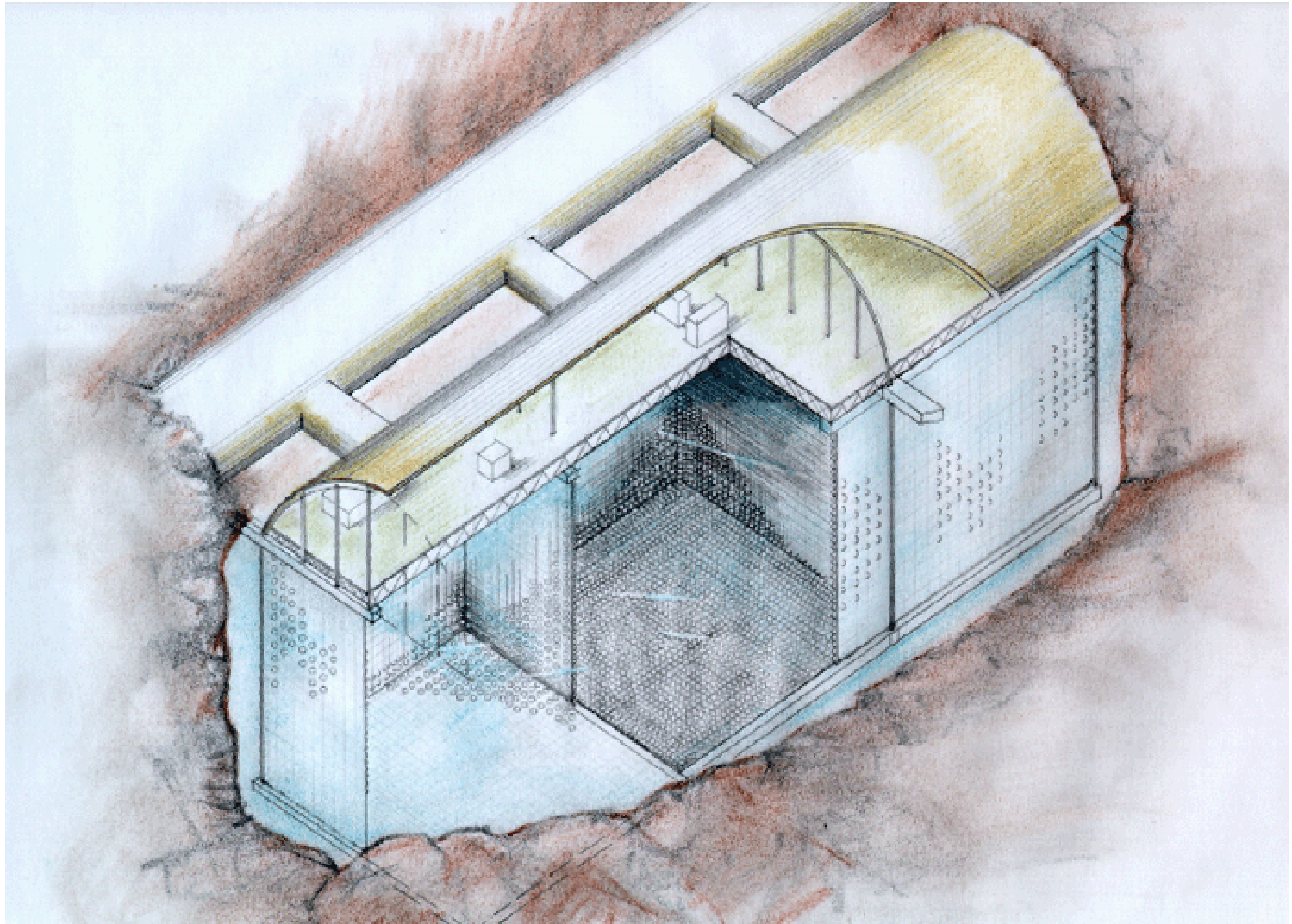


Homestake Laboratory (Near Term)

Future Development



Mega-Detector - UNO



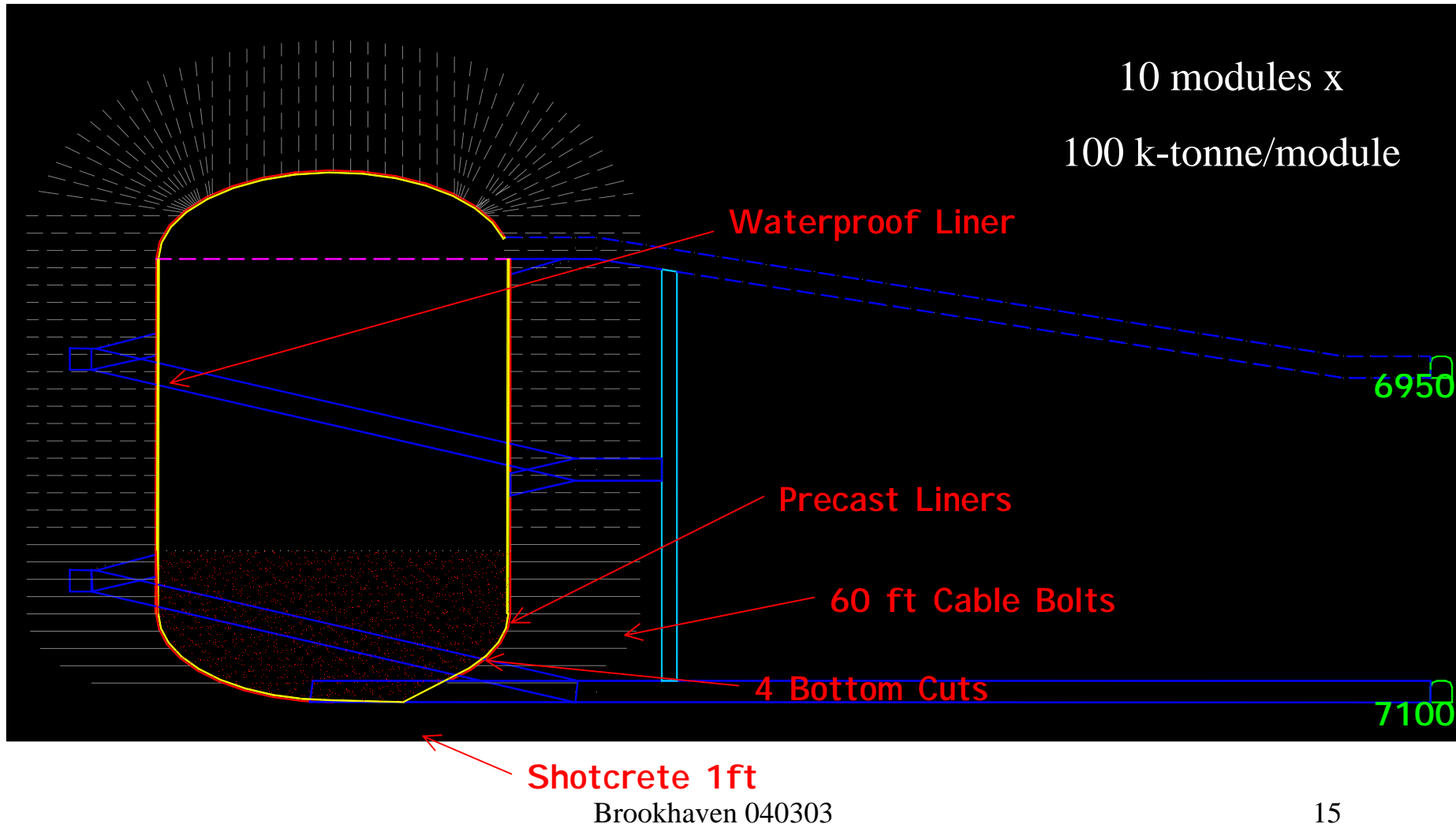
✓ Modular Configuration



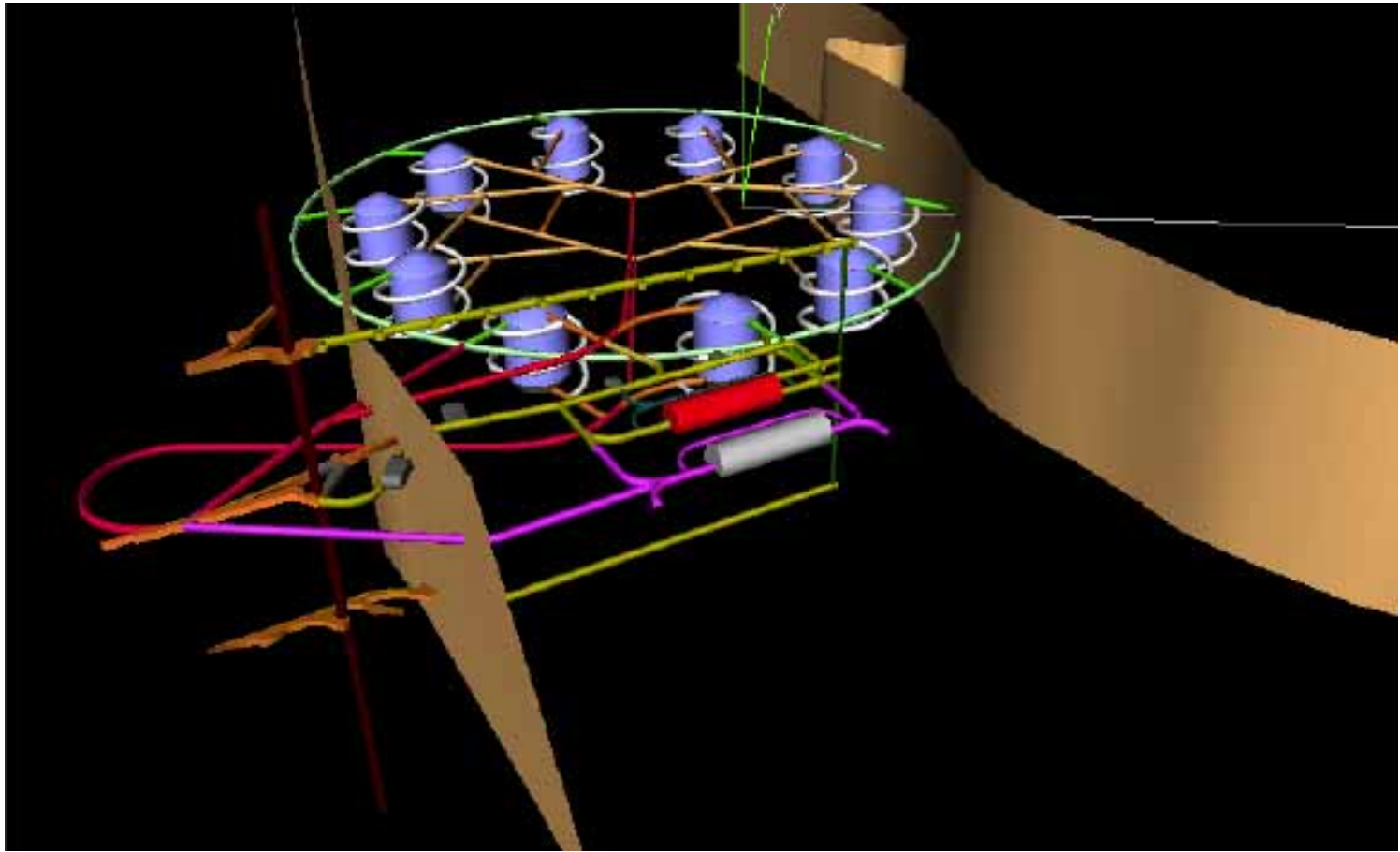
MEGATON MODULAR MULTI-PURPOSE DETECTOR

✓ Estimated Timeline

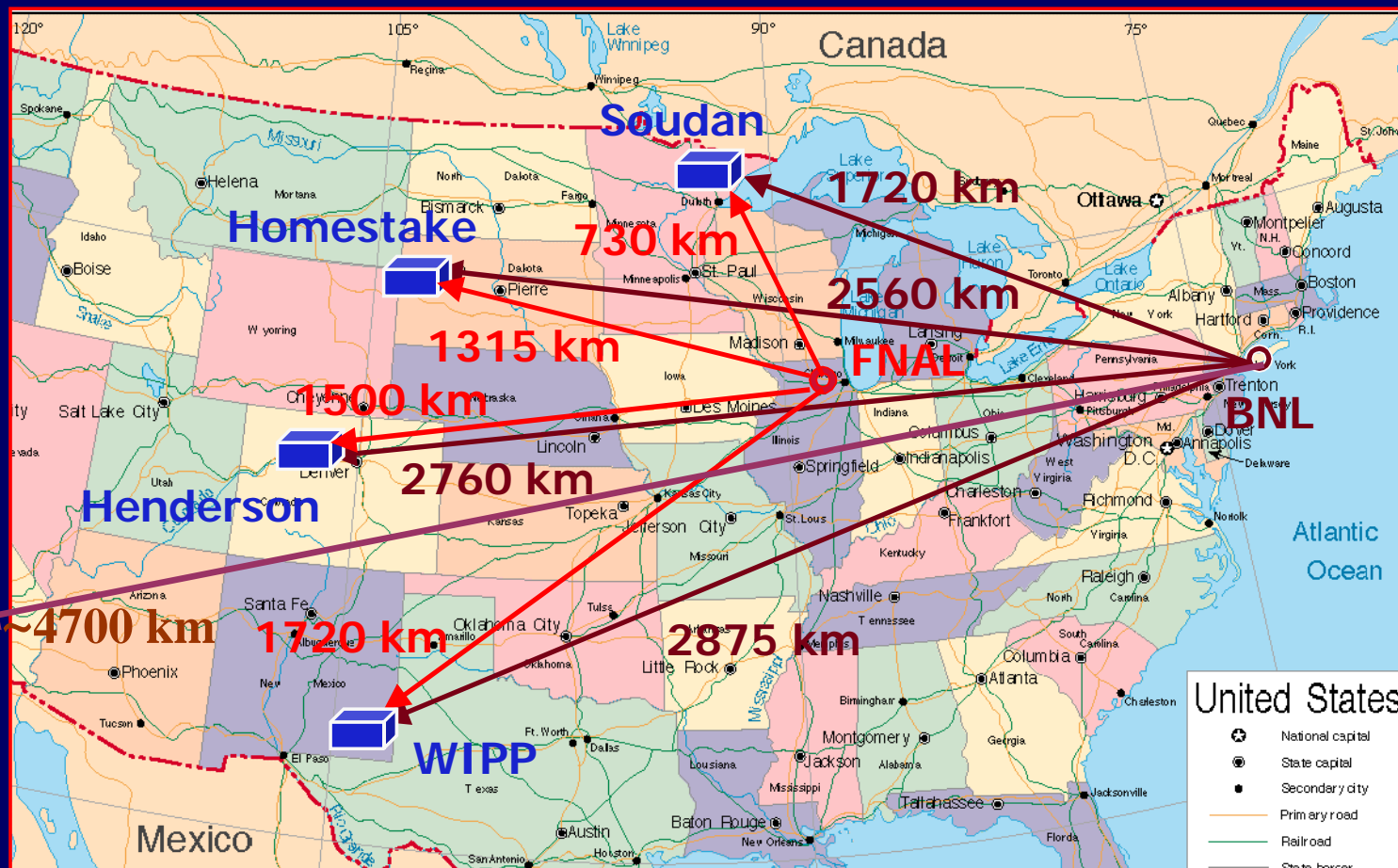
Year Four



Addition of Mega-Detector



Baselines to various deep sites



Homestake Flooding

- Shutdown of Homestake, June 2003
 - Flooding at 700 GPM
 - At 4850 L ~ May 2007
 - At 5300 L ~ May 2006
- Dynatec Engineering Report
 - Maintenance of Mine Stability –
 - Low water acidity
 - Equipment Damage or Replacement
 - Submerged mechanical and electrical equipment believed repairable but, conservatively, will be replaced
 - Operating Approval for water disposal required
 - Low water impurity content (albeit warm)
 - Preservation of Rock Mass
 - Integrity of high quality rock mass will not be compromised

Homestake Flooding

- NSF Reviewer Comment
 - I've read the short report by Dynatec about the effects of flooding and **am in agreement with the general assessment.**
 - There is always some deterioration of the "tunnel" walls... There will be some clean-up as a consequence, not at all unusual.
 - The **conservative cost view of replacing any equipment that becomes submerged is wise...**
 - [T]he **operating approvals should be "routine"** because of the long history of mining at the site (unlike problems that could arise in a "greenfield").
 - Their experience with **rock mass stability during dewatering of other mines flooded** for short and longer periods of time is also what I would expect, that is, no great instabilities or "cave-ins". **I and the other "DUSEL" panel members arrived at the same conclusion earlier this year.**

Homestake Schedule for Underground Infrastructure

Assumption:
Dewatering Begins
May 2006

Major System Tasks	Scheduled Completion (Months after start)
Detailed Engineering (begin)	0
Detailed Engineering (complete)	3
Yates rehab (begin)	4
Ross begin rehab (begin)	4
# 6 Winze (begin)	6
Dewatering (begin)	7
Basic Facility Construction (begin)	15
Yates (complete)	18
7400 ft Level Construction (begin)	20
# 6 Winze (complete)	21
Ross complete rehab	21
Dewatering (complete)	21
Basic Facility Construction (complete)	26
Conversion (Complete)	32

Cost Scenario for Infrastructure Lab

Dynatec estimate

• Underground Infrastructure	94M\$
– Dewatering	5.8 M\$
• Surface Buildings	4
• Transfer costs (indemnification, transfer)	20
• Bonding (optional for 5 years)	8
– Forward Funding over 5 years	
• Total Infrastructure Constr.	126
– State of SD appropriation	24.3
– NSF Request over 5 years	102
• Outyear Operating Costs	8.1/year

Advantages of Homestake

- Site available Immediately
 - Site acquisition terms negotiated
 - Short time from funding to excavation for detectors (2.5 years)
- All identified experiments accommodated
- Accepts large experiments – high rock quality
- Valuable infrastructure from mine utilized
- Rapid environmental approval anticipated
- Robust funding profile guaranteed by the State
- Unprecedented State and local support